High Performance Computing with Configuration Management

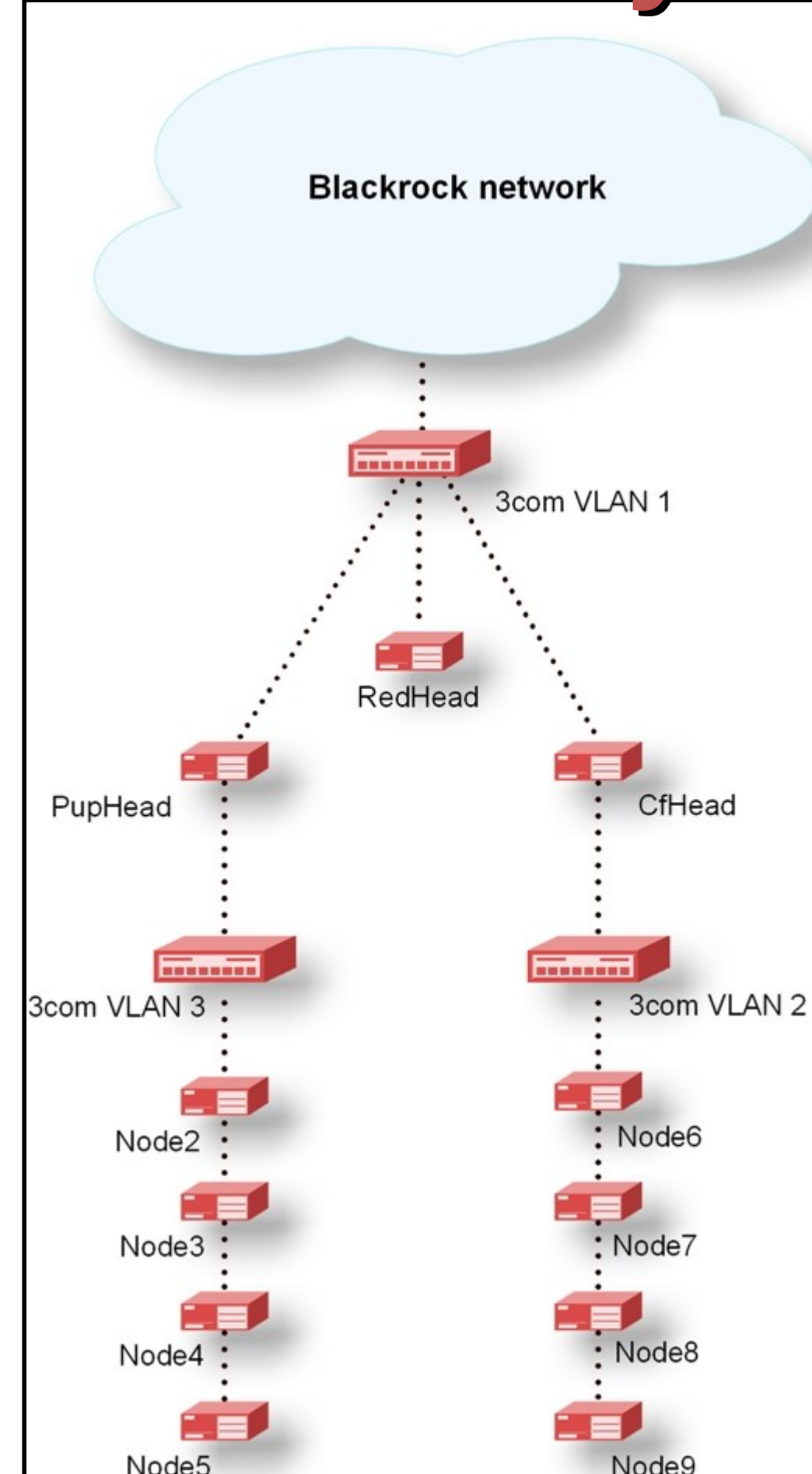**Team:** Evan Leeseberg, James Kang, Katherine Nystrom
Mentors: Kevin Tegtmeier, Andree Jacobson, Carolyn Connor

Cluster Layout

Blackrock network
3com VLAN 1
RedHead
PupHead
CfHead
3com VLAN 3
3com VLAN 2
Node2
Node6
Node3
Node7
Node4
Node8
Node5
Node9

This is a diagram of our cluster. Using Virtual Local Area Networks allowed us to simulate having two clusters even though all the machines are connected to the same switch.

Front view of cluster

Back view of cluster

Abstract

This research project investigated the Cfengine and Puppet configuration management tools and evaluated their strengths and weaknesses. Each configuration management tool was implemented on separate Virtual Local Area Networks (VLANs) and run on designated servers to manage their respective nodes. Cfengine is currently used on LANL clusters, and Puppet is being considered for use on future clusters.

Why Configuration Management?

- Number of cluster nodes is increasing—not practical to configure everything manually

- Important to build nodes quickly and correctly

- Prevents system drift - configuration differing across nodes

Implementation Issues

- Documentation - incomplete, contained errors , vague

- Bootstrapping - implementation not straight-forward

Goals

- Analyze two configuration management tools.

- Determine whether Puppet is a viable replacement for Cfengine.

- Create Puppet/Cfengine configuration files capable of completely reinstalling the Puppet and Cfengine head nodes.

Summary

- Puppet is a viable alternative to Cfengine.

- Cfengine has a mature user base and ample documentation. Puppet is relatively new and gaining popularity. Puppet is supported by an open development community.

- We were able to net boot cluster nodes, use Puppet or Cfengine to configure them and reintegrate them into the cluster within minutes.

Cfengine vs. Puppet

Cfengine
- Declarative programming language
- Closed development
- Supported by one man
- Large amounts of documentation
- Proven and mature management tool
- Not very proficient with higher level operations

(shared)
- Large user community
- Still under constant development
- Work very well with configuration file distribution

Puppet
- Ruby programming language
- Open development community
- Strong cross-platform support
- Easy to use for higher operations
- Developed as a response to Cfengine weaknesses

Subversion

- All Puppet and Cfengine configuration files and system configuration files were managed with Subversion
- The Staging and Working directories are checked out copies from the database
- Working directory used for all editing
- After an edit the file is checked back into the database and manually copied to the Test directory
- Staging directory holds the current production copies of files
- Files are copied from Staging to the Live directory.

Subversion Database
Staging Directory
Working Directory
Live Directory
Test Directory
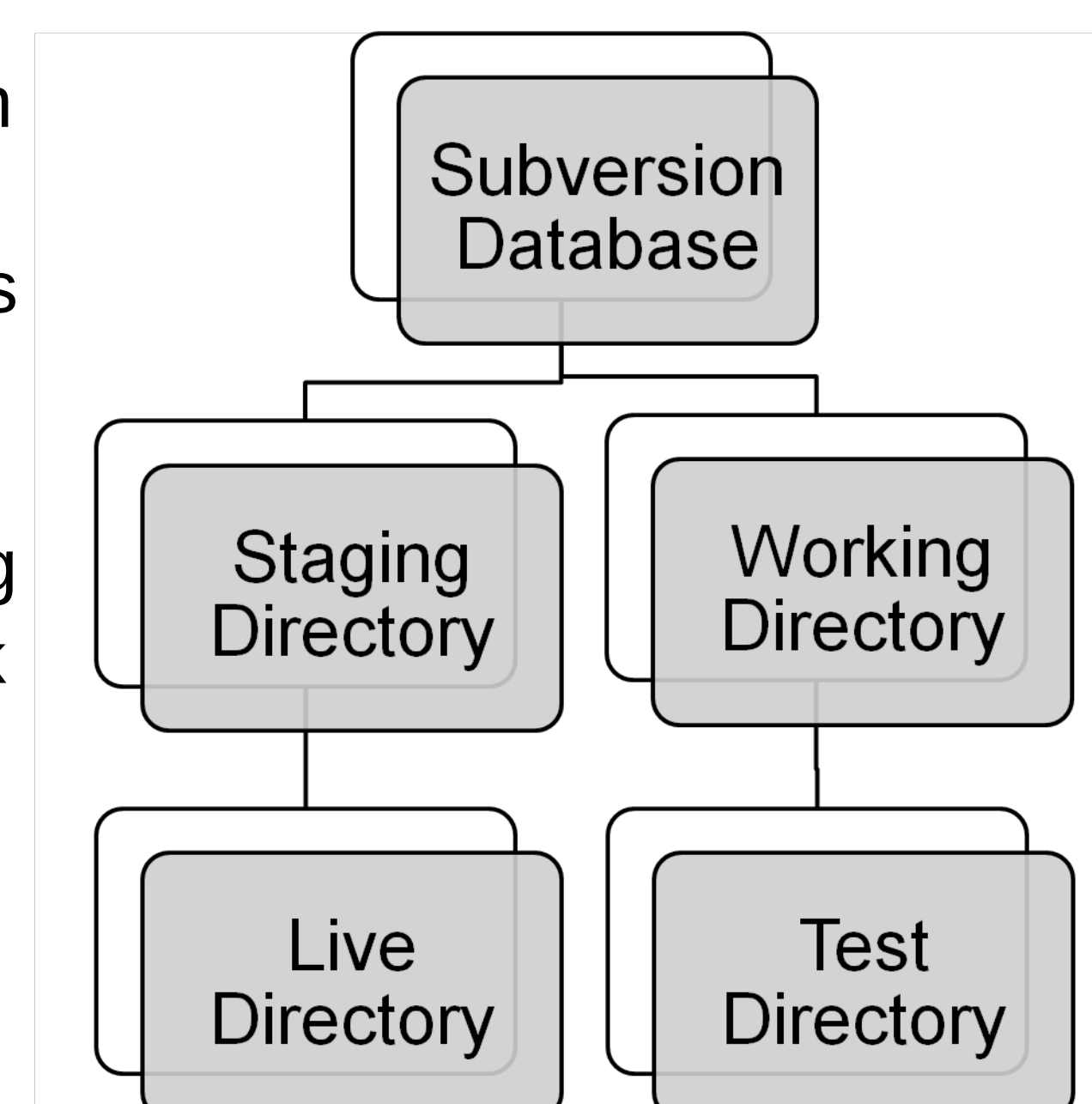
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